UNITED NATIONS

GENERAL ASSEMBLY

Distr.
GENERAL

A/AC.105/565
16 December 1993

ENGLISH
ORIGINAL: ENGLISH/SPANISH/
CHINESE

COMMITTEE ON THE PEACEFUL
USES OF OUTER SPACE

NATIONAL RESEARCH ON SPACE DEBRIS

SAFETY OF NUCLEAR-POWERED SATELLITES

PROBLEMS OF COLLISIONS OF NUCLEAR POWER SOURCES WITH SPACE DEBRIS

Note by the Secretariat

CONTENTS

	Page
INTRODUCTION	2
REPLIES RECEIVED FROM MEMBER STATES	3
China	3
Cuba	7
Ukraine	7

V.93-91144T

INTRODUCTION

1. In paragraph 27 of its resolution 48/39 of 10 December 1993, the General Assembly considered that it was essential that Member States pay more attention to the problem of collisions of space objects, including nuclear power sources, with space debris, and other aspects of space debris, and called for the continuation of national research on this question, for the development of improved technology for the monitoring of space debris and for the compilation and dissemination of data on space debris. To the extent possible, the Assembly noted, information thereon should be provided to the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space.

2. The General Assembly, in paragraph 14 of the same resolution, invited Member States to report to the Secretary-General on a regular basis with regard to national and international research concerning the safety of nuclear-powered satellites.

3. The Secretary-General addressed a note verbale dated 17 August 1993 to all Member States, inviting them to communicate to the Secretariat, by 31 October 1993, the information requested above so that the Secretariat could prepare a report containing this information for submission to the Subcommittee at its thirtieth session.

4. The present document was prepared by the Secretariat on the basis of information received from Member States as of 15 December 1993. Information received subsequent to that date will be included in addenda to the present document.

REPLIES RECEIVED FROM MEMBER STATES*

CHINA

[Original: Chinese]

The status of space debris in China

September 1993

The outer space resource is for the common exploitation of mankind, and it is a common responsibility of mankind to protect the outer space environment. With the rapid development of space technologies, and especially with the busy space activities of some major space Powers, space debris are steadily increasing in quantity and have brought grave potential threats and actual damage to the outer space environment and human activities in space.

At its thirty-sixth session in 1993, the Committee on the Peaceful Uses of Outer Space recommended to the Scientific and Technical Subcommittee that a new item entitled "Space debris" should be added to its agenda at its next session, and the Chinese Government strongly supported this.

In the period of over 20 years since it started activities in space, China has launched only a limited number of outer space objects. However, the Chinese Government has been very concerned about the problem of space debris. In recent years, China has made appeals for the strengthening of international cooperation in this field; in addition, a study group on the problem of space debris involving interested experts was established in 1989. The experts have come to the following conclusions: outer space is for the common exploitation of all mankind and the protection of the outer space environment is a shared responsibility of all nations; some major space Powers are the main generators of space debris, and should therefore take the main responsibility for the protection of the outer space environment and the control of space debris; space debris is a global problem, the effective control of which can only be achieved through international cooperation; China, being a developing country, has conducted only a limited number of space launchings, which have produced an insignificant amount of space debris, but China will treat and study this problem in a serious manner so as to make its due contribution to the protection of the outer space environment.

Over the past few years, the research institutes concerned in China have followed closely the international developments in the study of space debris, participated in various international conferences held in Japan, the United States of America, Germany, China and other countries, collected information on the subject, and carried out such activities as academic exchanges and seminars together with interested experts of other countries. In Chinese newspapers and journals, the related aspects of the space debris problem have been explained and some academic theses published, with the aim of encouraging more

*The replies are reproduced in the form in which they were received.

people to pay attention to this problem and take part in its study. Besides the above-mentioned study group on the problem of space debris, some other scientific institutions and universities are also conducting academic exchanges and research concerning the problem of space debris.

The space debris research which China is conducting under the existing conditions deals with its various technical aspects, its definition, the uniformity of its terminologies and national policies, etc. The initial results from the research are contained in a detailed report submitted in March 1991, which was already issued as a United Nations document (A/AC.105/510). The relevant Chinese research institutions are conducting studies in the following areas:

1. Conditions of the satellites and launch rockets launched by China:

The focus placed on compiling the information concerning the conditions of the Chinese satellites and launch rocket final stages launched in the past two years (see annexed tables I and II).

2. Measures to prevent and reduce space debris:

No measures are required at the design stage for those parts and components of satellites and launch rocket final stages which either do not enter an outer space orbit or are capable of returning to the atmosphere soon after their entry. For the parts and components that are sent into longer-orbital-lifetime outer space orbits together with satellites and final-stage rockets, it is necessary to take measures to tether them with the main objects in order not to produce more debris.

The earlier re-entry of a final-stage launch rocket into the atmosphere to shorten its orbital life is made possible by lowering the perigee altitude of the geosynchronous transfer orbit, when conditions permit.

A special release system has been developed for the final stage of the Long March-4 launch rocket. This system is designed to release, after satellite-rocket separation, the residual propellant from the tank and the residual gas from the high-pressure container in the booster, in order to avert the danger of in-orbit disintegration of the final-stage rocket.

The de-orbiting technology will be used on the improved Long March-2 launch rocket which is to carry the Yi satellite. This will make possible the earlier re-entry of the final-stage rocket.

Whenever possible, reentry satellites would be used for carrying out scientific experiments in outer space, and to reduce the number of jettisoned satellites in outer space efforts would be made to improve satellites and launch rockets in terms of design, launching technique and reliability.

3. Tracking observation:

By studying the status of tracking observation and by making use of optical observation networks, larger chunks of space debris may be tracked, and an improved optical telescope will make the tracking even more effective. The observations that have so far been made on a selective basis showed good results. They are targeted at the space objects launched by China as well as at the space debris generated by other countries, e.g. the conditions of the debris from some of the satellites launched by the United States and the former Soviet Union.

4. Mathematical modelling:

China's study on the mathematical modelling of space debris is still at the stage of collection of information and carrying out of investigations. The current emphasis is on collecting information relating to the time, space, speed and flux distribution of space debris, exploring the ways to establish mathematical models, and undertaking preparatory work for their final establishment.

With a view to conducting the study on space debris more effectively and to protecting the outer space environment, China wishes to make the following suggestions to the United Nations and its competent bodies:

1. There should be stronger publicity about the serious hazards that space debris may bring to man's peaceful uses of outer space and about the necessity of early prevention and control, so that Governments, especially the space Powers which have the main responsibility, will give serious consideration to the problem of pollution of the outer space environment caused by space debris and take measures to control and manage space debris. If necessary, activities may be organized to observe the Day for the Protection of the Outer Space Environment.

2. Academic exchanges and international cooperation on space debris should be arranged and coordinated, which may include increasing awareness of the question of space debris, discovering technical methods and exchanging experience on keeping the quantity of space debris from growing, sharing out subjects for study and cooperating with one another. In particular, concrete measures should be taken to assist and support developing countries in conducting studies on space debris as well as their control and reduction.

3. Technical norms governing the prevention and control of space debris should be formulated as early as possible, in order to provide the groundwork for the development of basic guidelines on the protection of the outer space environment, and later the formulation of an international convention thereon, when conditions are ripe.

Table I

Table of Chinese satellites sent into outer space (1991-1992)

Date launched	International code No.	Satellite name	Satellite mass (kg)	Initial orbits				Remarks
				Altitude of perigee (km)	Altitude of apogee (km)	Orbital inclination (°)	Orbital period (min)	
28/12/91	1991-88A	Experimental communications satellite	441	1,920	34,123	31.2	632	Failed to enter destined orbit to conduct communications experiments
9/8/92	1992-51A	New type of re-entry satellite	2,580	176	356	63	89.7	Returned on 25 August
6/10/92	1992-64B	Re-entry satellite	2,080	217	320	63	89.7	Returned on 13 October

Table II

Table of final stages of launch rockets launched into orbit by China (1991-1992)

Sequence No.	Date launched	Launch rocket	Altitude of perigee (km)	Altitude of apogee (km)	Orbital inclination (°)	Orbital period (min)	Remarks
1	28/12/91	CZ-3	216	2,754	31.1	116	
2	9/8/92	CZ-2D	176	365	63	97.2	Fallen to earth
3	14/8/92	CZ-2E	202	1,051	28.4	89.7	Fallen to earth
4	6/10/92	CZ-2C	217	318	63	89.7	Fallen to earth

CUBA

[Original: Spanish]

In this connection, the Government of the Republic of Cuba states that at present it is not conducting any research relating to space debris, although it is following closely and with great attention all developments in this important matter, which also has an impact on Cuba's environment.

UKRAINE

[Original: English]

Development of technology and equipment to salvage of space debris

Purpose: Creation of space debris-to-capsule technology with equipment location on-board specific spacecraft and/or space station technology module.

This technology will provide for salvaging or advance caught space debris. By the use of the closed-gas-cycle HIP method, an efficient, ecologically clean technology is being developed for compaction and disposal of space debris including radioactive ones. With their subsequent enclosure in multibarrier protective corrosion resistant shells space debris will have a long term of safe storage and/or can be used as auxiliary materials.